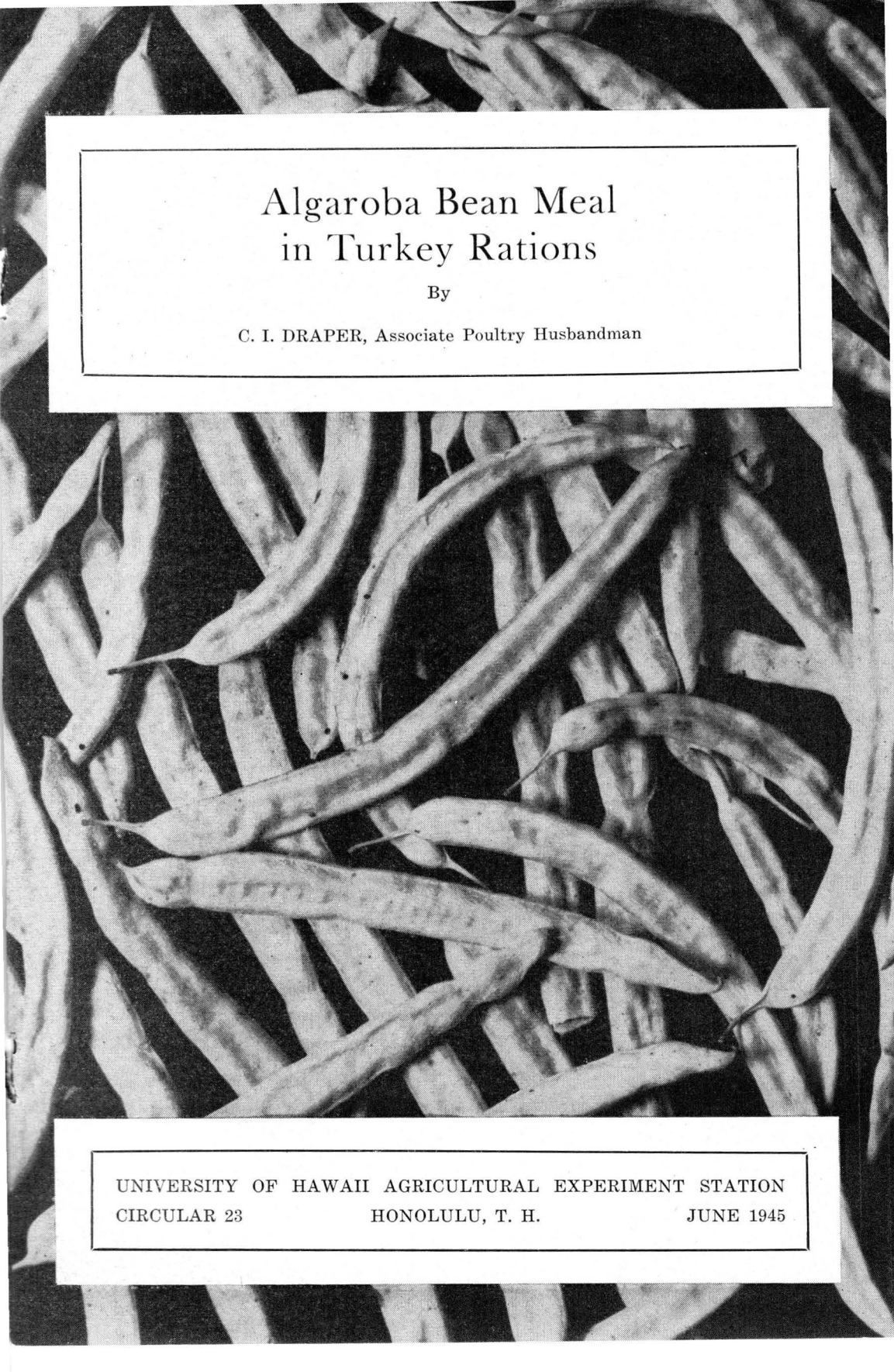

Algaroba Bean Meal in Turkey Rations

By

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CIRCULAR 23 HONOLULU, T. H. JUNE 1945

INTRODUCTION

The algaroba tree was introduced to the Hawaiian Islands over a century ago and has spread to many sections of the Territory.[1] It now covers many hundreds of acres of land. The algaroba produces an abundance of beans which have a composition similar to oats and barley except for a higher fiber content. Each year thousands of tons of these beans are fed to animals, but even larger quantities are left on the ground to decompose.

At the Hawaii Agricultural Experiment Station most rations used in the past with algaroba bean meal as an ingredient also contained other locally produced feeds of undetermined nutritive value. Hence, the food value of this product in combination with feeds of proved value has not been fully established. Reports from the field suggest that large quantities of algaroba bean meal can replace cereal grains in the ration of laying hens.

This circular reports results of an experiment designed to compare effect of various amounts of algaroba bean meal in mash fed to turkeys.

PLAN OF EXPERIMENT

Under comparable conditions of housing and management, 132 poults were raised in confinement. The poults were distributed at random into 12 lots of 11 poults per lot.

Each of six all-mash rations tested was fed to duplicate lots of turkeys to 8 weeks of age. From 8 to 28 weeks of age, turkeys of each lot had free access to whole wheat, whole oats, whole corn, granite grit, and oystershell grit in addition to the mash. To insure an adequate amount of pro-vitamin A, 20 percent yellow corn was included in each mash. The remainder of the cereal grains and the millrun were premixed into a cereal basal.[2] To determine to what extent algaroba bean meal can replace the ingredients of the cereal basal, 20, 40, 60, 80, and 100 percents of the cereal basal in the control mash (ration 1) were replaced by algaroba bean meal.

The individual ingredients of the mashes were analyzed separately and from the information obtained each starting mash was adjusted to 23.0 percent protein, 1.6 percent calcium, and 0.6 percent phosphorus. The mashes fed during the developing period were adjusted to 20.0 percent protein, 2.2 percent calcium, and 1.3 percent phosphorus. The exact composition of the mashes is given in table 1.

Rate of growth, pounds of feed required to produce a pound of gain, and degree of finish for the market were used to compare the merits of the various rations.

[1] Webster's New International Dictionary, Second Edition, gives "algarroba" as the correct spelling. However, the spelling used here is the one in local usage.

[2] The percentage composition of the cereal basal was ground wheat, 40; ground oats, 20; and millrun, 40.

Table 1. Starting and developing rations fed to experimental turkeys

	RATION NUMBER					
	1	2	3	4	5	6
Ratio of cereal basal (CB) to algaroba bean meal (AB) in the mash	CB 100 AB 00	CB 80 AB 20	CB 60 AB 40	CB 40 AB 60	CB 20 AB 80	CB 00 AB 100
All-mash rations	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Starting mashes						
Cereal basal	32.50	26.00	19.40	12.90	6.40	0.00
Algaroba bean meal	0.00	6.50	13.00	19.50	26.00	32.40
Ground yellow corn	20.00	20.00	20.00	20.00	20.00	20.00
Protein concentrate*	34.00	34.00	34.10	34.10	34.10	34.20
Alfalfa meal	7.00	7.00	7.00	7.00	7.00	7.00
Feed yeast	4.00	4.00	4.00	4.00	4.00	4.00
Ground oystershell	1.10	1.00	0.90	0.90	0.80	0.60
Steamed bonemeal	0.00	0.10	0.20	0.20	0.30	0.40
Salt	1.00	1.00	1.00	1.00	1.00	1.00
Fish oil (concentrated)	0.40	0.40	0.40	0.40	0.40	0.40
Manganese sulfate	0.20oz.	0.20oz.	0.20oz.	0.20oz.	0.20oz.	0.20oz.
Developing mashes						
Cereal basal	43.50	34.40	25.70	17.00	8.50	0.00
Algaroba bean meal	0.00	8.60	17.00	25.50	33.80	41.80
Ground yellow corn	20.00	20.00	20.00	20.00	20.00	20.00
Protein concentrate*	20.00	20.50	20.90	21.20	21.50	21.90
Alfalfa meal	8.00	8.00	8.00	8.00	8.00	8.00
Feed yeast	4.00	4.00	4.00	4.00	4.00	4.00
Ground oystershell	1.30	1.20	1.00	0.90	0.80	0.70
Rock phosphate	2.00	2.10	2.20	2.20	2.20	2.40
Salt	1.00	1.00	1.00	1.00	1.00	1.00
Fish oil (concentrated)	0.20	0.20	0.20	0.20	0.20	0.20
Manganese sulfate	0.40oz.	0.40oz.	0.40oz.	0.40oz.	0.40oz.	0.40oz.
Calculated fiber analysis:						
Starting mashes	6.03	6.97	7.93	8.88	9.83	10.77
Developing mashes	6.30	7.54	8.76	10.01	11.22	12.39

* The percentage composition of the protein concentrate was soybean oil meal, 75; and meat meal, 25.

ALGAROBA BEAN MEAL IN THE STARTING RATION

The influence of algaroba bean meal content on rate of gain, feed consumption, and efficiency of feed utilization during the brooding period is shown in table 2. The turkeys fed the rations containing the higher levels of algaroba bean meal (rations 5 and 6) made less gain and consumed slightly less feed than any other lot. As the percentage of algaroba bean meal in the ration increased, more pounds of feed were required to produce a pound of gain. This trend is rather pronounced.

Because it was impossible to have the poults sexed, the ratio of the sexes differed slightly in the various lots. When the turkeys had developed so that sex could be determined, it was found that the ratio of males to females was approximately the same in the lots fed rations 1, 2, 5, and 6. The lots fed ration 3 had a predominance of females and those fed ration 4 a predominance of males. Because of this difference the efficiency of feed utilization rather than feed consumption or gain in body weight appears to be the logical basis for comparison. A more direct comparison can be made between the lots fed rations 1, 2, 5, and 6.

Table 2. Growth, feed consumption, and feed efficiency of small white turkeys during the brooding period*

	RATION NUMBER					
	1	2	3	4	5	6
Ratio of cereal basal (CB) to algaroba beans (AB) in the mash	CB 100 AB 00	CB 80 AB 20	CB 60 AB 40	CB 40 AB 60	CB 20 AB 80	CB 00 AB 100
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Initial body weight	0.12	0.12	0.12	0.12	0.12	0.12
Body weight at 2 weeks of age	0.28	0.29	0.28	0.29	0.27	0.28
Body weight at 4 weeks of age	0.77	0.76	0.71	0.72	0.65	0.65
Body weight at 8 weeks of age	2.40	2.22	2.04	2.27	1.99	1.81
Feed consumed per bird to 8 weeks of age	5.85	5.71	5.71	6.23	5.62	5.48
Pounds of feed per pound of gain to 8 weeks	2.57	2.72	2.97	2.90	3.01	3.24

* All figures are averages of duplicate lots.

ALGAROBA BEAN MEAL IN THE DEVELOPING RATION

Body weight, feed consumption, and feed efficiency for all lots during the developing period are given in table 3.

The final results obtained in the lots fed rations 3 and 4 were undoubtedly the result of a predominance of females in the lots fed ration 3 and males in the lots fed ration 4. During the developing period, the lots fed rations 5 and 6 made very satisfactory gains, especially during the last 4 weeks of the experiment. At 28 weeks of age, these lots compared favorably with the control lots in every respect. The amount of fat and feathering in lots fed a ration containing 41 percent algaroba bean meal was as good as in the control lots. The slower gains made by the lots fed rations 5 and 6 during the brooding period and the faster compensatory gains made during the developing period suggest that turkeys can utilize a high fiber ration to a better advantage as they approach maturity.

The average feed consumption per bird for all lots for the 28-week experimental period was 66.50 pounds. Of this total, 36.7 pounds were consumed as mash and 29.8 pounds as whole grain. Of the whole grains consumed, 13.7 pounds were wheat; 10.6 pounds, oats; and 5.5 pounds, corn. The mash and grain consumption of the various lots over the 28-week experimental period are presented graphically in figure 1.

Table 3. Growth, feed consumption, and feed efficiency during the developing period, 8 to 28 weeks of age*

	RATION NUMBER					
	1	2	3	4	5	6
Ratio of cereal basal (CB) to algaroba beans (AB) in the mash	CB 100 AB 00	CB 80 AB 20	CB 60 AB 40	CB 40 AB 60	CB 20 AB 80	CB 00 AB 100
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Average body weight at 12 weeks of age	4.56	4.61	4.27	4.92	4.09	4.10
Average body weight at 16 weeks of age	7.10	7.16	6.66	7.09	6.46	6.31
Average body weight at 20 weeks of age	9.60	9.17	8.46	9.49	8.29	8.65
Average body weight at 24 weeks of age	10.87	9.86	9.56	10.82	9.96	9.86
Average body weight at 28 weeks of age	13.24	13.25	11.62	15.18	13.08	13.08
Feed consumed per bird 8 to 28 weeks	66.26	59.66	60.55	64.33	56.49	56.84
Pounds feed per pound gain 8 to 28 weeks	6.11	5.40	6.32	4.98	5.09	5.04

* All figures are averages of duplicate lots.

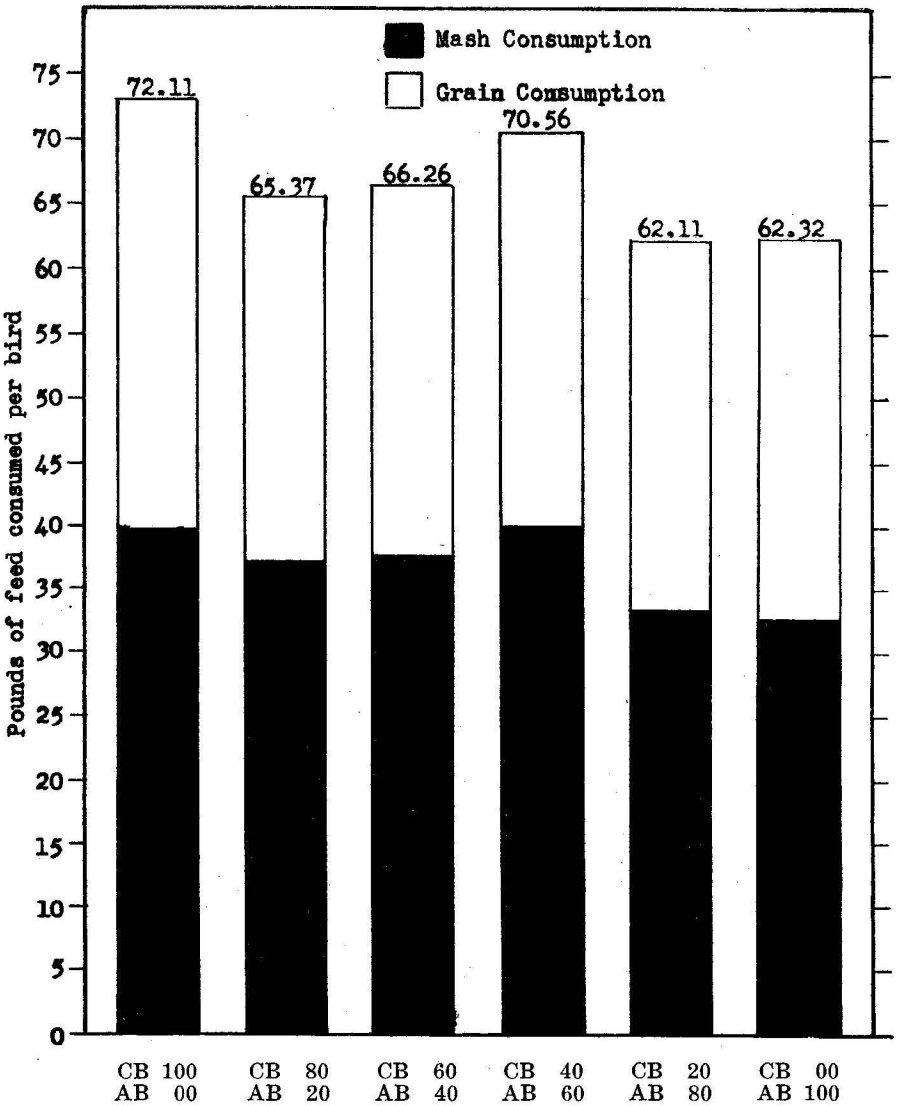

Figure 1. Pounds of feed consumed per bird during the entire experimental period.

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